**Course: 8th Math CCSS Standard Number(s): 8.NS.2 Day:**

**Unit # and Title: Unit One Expression and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | Why would you find rational approximations of irrational numbers?  In what ways can rational numbers be useful? | | |
| **Learning Target(s)**  **“I can statements”** | * I can use reasoning to determine between which two consecutive whole numbers a square root will fall. * I can plot the estimated value of an irrational number on a number line. | | |
| **Essential Vocabulary** | irrational number  rational number  square root  cube root  number line  non terminating decimal  estimate  approximate  consecutive  perfect square  non-perfect square | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| * **projector** * **holt 3-6 Practice WKST** * **holt 3-6 Reading Strategies WKST** * **blank number line or graph paper for students to create a number line** | | * **student white boards** * **markers** * **poster board (for extension)** |
| **8 Mathematical Practices:** | | | |
| * Make sense of problems and persevere in solving them. * 2. Reason abstractly and quantitatively. * 3. Construct viable arguments and critique the reasoning of others. * 4. Model with mathematics. | | * 5. Use appropriate tools strategically. * 6. Attend to precision. * 7. Look for and make use of structure. * 8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | Human Number Line: Have 17 students each take a small white board and place one of the following assigned numbers on it:  Have them create a human number line in order to the best of their ability without a calculator. | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | ME: Once everyone has agreed on the correct order, have the students place the white boards where everyone can see them (on the ledge of the board). Everyone in the class will copy the numbers on a blank sheet. Have the students calculate the square roots of the numbers that they know. What perfect squares are near the ? What perfect squares are near the How can you use a number line to estimate a non-perfect square?    WE/FEW: Partner Scavenger Hunt/Matching Game: Give the students the following 10 problems with the matching answers listed around the room in various locations (or create a scavenger hunt). The students have to estimate the given number to the closest integer.  Problems (Answers)  YOU: Independently have the students take the previous 10 numbers and place them on a number line as close to where they think they lie to the nearest whole number. \*In the next lesson they will use this number line to make further approximations of the number.\* | | |
| **Summarizing Strategy**  **(Closing Activity)** | [Multiple Choice TOD](http://www.ixl.com/math/grade-8/estimate-positive-and-negative-square-roots) | | |
| **Assessment/Homework** | [**3-6 Practice Wkst from Holt**](8.NS.2%20day%201%20HW.docx) **(self created from Practice A and Practice B )** | | |
| **Extending/Refining** | **Extension: Take all of the numbers from the homework and create a poster explaining how to find an estimate of a square root. Also, create a number line on the poster with the correct placement of the numbers from the homework.**  **Refining:** [**Holt Section 3-6 Reading Strategies WKST**](http://my.hrw.com/math12/na_cc/msm_burger/teacher/osp/msm3/data/chap03/section06/reading_strategies.pdf) | | |

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| **Unit Essential Question(s):** | Why would you find rational approximations of irrational numbers?  In what ways can rational numbers be useful? | | |
| **Learning Target(s)**  **“I can statements”** | * I can use reasoning to determine between which two consecutive whole numbers a square root will fall. * I can plot the estimated value of an irrational number on a number line. | | |
| **Essential Vocabulary** | **less than**  **greater than**  **tenths**  **hundredths** | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| [Teacher web PowerPoint](file:///G:\Lesson%20Planning%20Workshop\8th%20grade%20Unit%201\8.NS.2%20powerpoint_estimatingsquareroots.ppt)  **Holt Online Edition** | | **Ruler**  **Math journal** |
| **8 Mathematical Practices:** | | | |
| * 1. Make sense of problems and persevere in solving them. * 2. Reason abstractly and quantitatively. * 3. Construct viable arguments and critique the reasoning of others. * 4. Model with mathematics. | | * 5. Use appropriate tools strategically. * 6. Attend to precision. * 7. Look for and make use of structure. * 8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | Write the in. on the board and have the students use a ruler to draw how long they think in. is. Have the students share their lengths and compare the differences in how long they are. How would this affect measurement in the real world? | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | \*\*This lesson may take more than 1 day, it ties into the next lesson which can be done in less than one day\*\*  ME: Use the [Teacher web PowerPoint](8.NS.2%20powerpoint_estimatingsquareroots.ppt) to take the students step by step through how to estimate a square root to a specific place value.  WE: Show the Holt Video from section 3-6 example 3.  FEW: Have student pairs complete the Holt 3-6 additional example 3. *Approximate to the nearest hundredth.* (11.87)  **Optional Activity**: Critiquing Exercise  Approximate the square root of 8.  Below is Sara’s response to this problem.  Since 8 is closer to 9 to approximate I will start at 9. Then, 9 – 8 = 1 and 9 – 4 = 5. I will write this as a fraction with 1 being the distance between the closest perfect square and 8 and 5 being the distance between the two closest perfect squares. I will then divide 1 divided by 5 to get the decimal approximation which is 0.2. I will then subtract 3-0.2 = 2.8.  Does Sara’s response answer the question correctly? Why or why not does her response give the correct answer?  YOU:  **You can find the approximate speed of a vehicle that leaves**  **skid marks before it stops. The formulas *S=* and**  ***S=* , where *S* is the speed in miles per hour and *L* is**  **the length of the skid marks in feet, will give the minimum and**  **maximum speeds that the vehicle was traveling before the**  **brakes were applied. Round to the nearest mile per hour.**  5. A vehicle leaves a skid mark of 40  feet before stopping. What was the  approximate speed of the vehicle  before it stopped?  A 25–35 mi/h **C** 29–31 mi/h  B 28–32 mi/h D 68–70 mi/h  6. A vehicle leaves a skid mark of 100  feet before stopping. What was the  approximate speed of the vehicle  before it stopped?  **F** 46–49 mi/h H 62–64 mi/h  G 50–55 mi/h J 70–73 mi/h  7. A vehicle leaves a skid mark of 150  feet before stopping. What was the  approximate speed of the vehicle  before it stopped?  A 50–55 mi/h C 55–70 mi/h  B 53–58 mi/h **D** 56–60 mi/h  8. A vehicle leaves a skid mark of 200  feet before stopping. What was the  approximate speed of the vehicle  before it stopped?  F 60–63 mi/h H 72–78 mi/h  **G** 65–70 mi/h J 80–90 mi/h | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Journal:** Have students answer the following questions in their math journal.  What is the process used to estimate square roots to the hundredths place? Why is this important for measurement in the real world? | | |
| **Assessment/Homework** | [**Holt Section 3-6 Practice (created from both A and B)**](8.NS.2%20day%202%20HW.docx) | | |
| **Extending/Refining** | **Extension: Given the decimal approximation find the approximate square root.**  **2.45**  **3.74**  **8.49**  **Refining: Holt Section 3-6** [**Success for Every Learner WKST**](http://my.hrw.com/math12/na_cc/msm_burger/teacher/osp/msm3/data/chap03/section06/success_english.pdf) | | |

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| **Unit Essential Question(s):** | Why would you find rational approximations of irrational numbers?  In what ways can rational numbers be useful? | | |
| **Learning Target(s)**  **“I can statements”** | * I can use reasoning to determine between which two consecutive whole numbers a square root will fall. * I can plot the estimated value of an irrational number on a number line. | | |
| **Essential Vocabulary** | **Ascending order**  **Descending order**  **number line**  **least**  **greatest** | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Number Line**  [**Ordering Rational/Irrational PowerPoint**](http://www.rhinebeckcsd.org/webpages/cpeck/math7a.cfm?subpage=1361113)  [Irrational War Game](file:///G:\Lesson%20Planning%20Workshop\8th%20grade%20Unit%201\8.NS.2%20compare%20irrationals%20war.docx)  **On Core WKBK** | | **Number Line**  **Calculator**  **On Core WKBK** |
| **8 Mathematical Practices:** | | | |
| * 1. Make sense of problems and persevere in solving them. * 2. Reason abstractly and quantitatively. * 3. Construct viable arguments and critique the reasoning of others. * 4. Model with mathematics. | | * 5. Use appropriate tools strategically. * 6. Attend to precision. * 7. Look for and make use of structure. * 8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | Put the following numbers on the board. , -, -, 1.5  Have the students investigate how to put these numbers in ascending order. What method did you use? | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | ME: Have a class discussion about the different ways to compare and order numbers.  -number line  -changing numbers to decimals  -calculator sort function  WE: <http://www.rhinebeckcsd.org/webpages/cpeck/math7a.cfm?subpage=1361113>  (Go to Ordering Rational and Irrational Numbers ppt, 7th one down on the list)  FEW: [Irrational War Game](8.NS.2%20compare%20irrationals%20war.docx): In pairs have students take the 20 cards and play a “war” game.  YOU: Have students take the cards that they have “gained” in the war game and put them in ascending order on a number line. | | |
| **Summarizing Strategy**  **(Closing Activity)** | Think/Pair/Share: How would you compare and order a list of numbers given on a test question at the end of the year without a calculator? | | |
| **Assessment/Homework** | **On Core Workbook: p 26 #9-20** | | |
| **Extending/Refining** | **Extension:** [**Comparing/Ordering WKST**](8.NS.2%20compare%20and%20order%20extension.pdf)  **Refining:** [**Gaggle Tube Video**](https://gaggle.net/gaggleVideoProxy.do?op=view&v=ebd5108af42bb5b6142b5de304d48b85) | | |